

4. TREND ANALYSIS

Based on the data collected, performance of the CMP Tier 1 network has been reported in the LOS Monitoring Studies using two measures – average speeds (since 1991) and vehicle hours of delay (since 2008). Using the data reported for these measures, the long-term trend in CMP network performance was analyzed in terms of the following:

- the delays occurring on the network
- the relationship between average speeds on the network and external factors that would impact traffic volume on the network
- the relationship between average speeds on the network and vehicle throughput

VEHICLE HOURS OF DELAY (VHD)

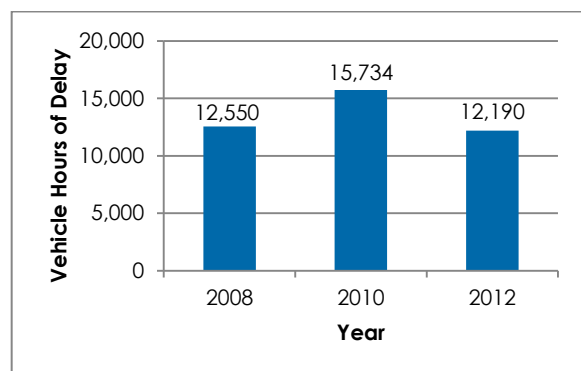
Since 2008, VHD for the LOS F freeway segments were reported. Consistent with the Caltrans and MTC definitions, VHD is described as having the congested threshold speed at 35 miles per hour or less and the bottleneck capacity as 2,200 vehicles per hour per lane. Since the average speed observed in the LOS Monitoring Study is based on the floating car runs over the 2-hour peak period, for VHD estimation purposes, congestion was assumed to occur only in this 2-hour peak period (Caltrans and MTC measure the actual congestion period by conducting the floating car runs beyond this 2-hour period). The total vehicle hours of delay was calculated by:

- 1) estimating the difference between how long it takes to travel a CMP LOS F network segment at 35 mph (congested threshold speed per Caltrans and MTC) and the actual speed that was observed in the travel-time survey; and
- 2) multiplying the difference in time estimated by the number of lanes, capacity per lane and the assumed congestion duration of 2 hours.

VHD During the p.m. Peak Period

Chart 1 shows the estimated total VHD on the LOS F freeway segments during the p.m. peak period for the past three LOS Monitoring cycles since 2008.

Chart 1: Vehicle Hours of Delay in LOS F Segments During the p.m. Peak Period



Despite a general increase in congestion reported in 2012, the VHD for the p.m. peak period shows a reduction from 2010, with a delay of 12,190 in 2012 compared to 15,734

in 2010. It is likely that this decrease is attributed to two completed projects that appeared to have improved the respective roadway performance: I-880/SR 92 Interchange Improvements and Eastbound I-580 HOV Lane.

These projects were under construction in 2010 but were completed when 2012 monitoring was performed:

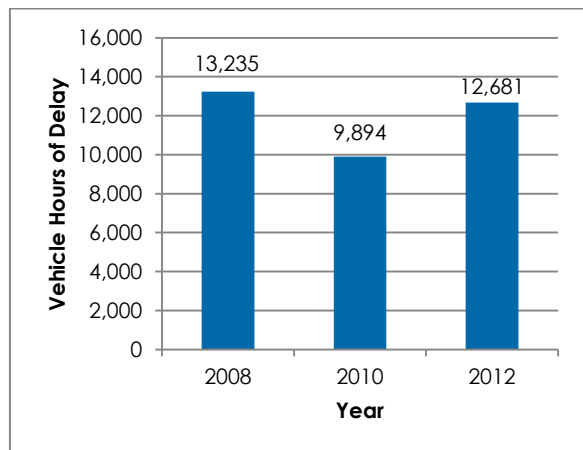
- Eastbound SR 92 near I-880 showed an estimated VHD of 1,980 in 2010, which was eliminated in 2012.
- Eastbound I-580 in East County showed an estimated VHD of 969 in 2012 compared to 4,328 in 2010, a reduction of 3,359 VHD.

These two projects alone contributed to a combined VHD reduction of 5,339, which is higher than the total VHD reduction of 3,544 experienced system-wide between 2010 and 2012 indicating that increased delay occurred on other parts of the CMP network.

VHD During the a.m. Peak Period

Similar to the p.m. peak period LOS F segments, VHD were estimated for the freeway segments operating at LOS F during the a.m. peak period. Chart 2 illustrates the estimated total VHD on LOS F freeway segments during the a.m. peak period for the past three LOS Monitoring cycles.

Chart 2: VHD in LOS F Segments During the a.m. Peak Period



The estimated total VHD on LOS F freeway segments during the a.m. peak period increased from 9,894 hours in 2010 to 12,681 hours in 2012, which is consistent with the general decreased speed experienced on the CMP network in 2012 as compared with 2010.

AVERAGE SPEEDS ON THE CMP NETWORK AND RELATIONSHIP TO JOBS AND VEHICLE MILES TRAVELED

Average speeds for the Tier 1 freeways and arterials during the p.m. peak period have been reported since 1991. The systemwide average speed statistics since 1991 for the Tier 1 network are shown in Appendix E-1.

Using the average speed data over the last 20 years, the long-term trend in performance of the CMP Tier 1 network was analyzed in terms of how it correlates with external factors that would influence commute travel (e.g., the economy) in Alameda County and more directly how it functioned with respect to the volume of traffic (i.e., vehicle miles traveled) on the CMP network. Unemployment was used as an indicator for the economy; it was based on data from the Bureau of Labor Statistics. Vehicle miles traveled (VMT) data was from the California Public Road Data published by Caltrans' based on its Highway Performance Monitoring System. Appendices E2 and E3 show the data for unemployment and VMT, respectively.

Chart 3 illustrates that a general correlation exists between the average speeds on the county freeways and the jobs in the Bay Area. When unemployment goes up (i.e., fewer jobs in the region), less traffic is expected to be on the road, thus average speed goes up. However, no correlation appears to exist between the average speeds on arterials and employment as shown in Chart 4. This also indicates the need to study the county arterials to better understand their performance.

Chart 3: Average Freeway Speeds and Unemployment

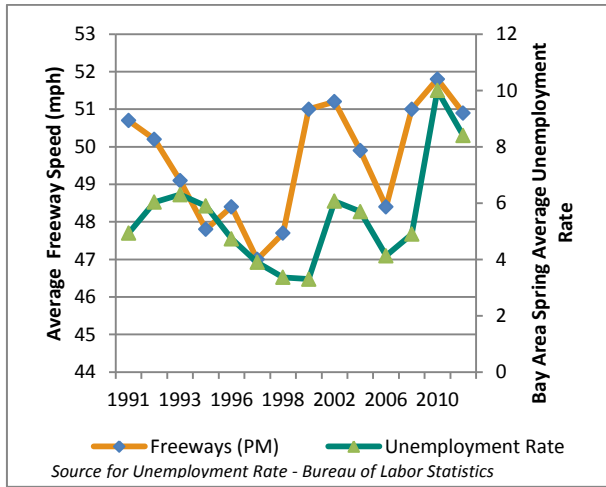
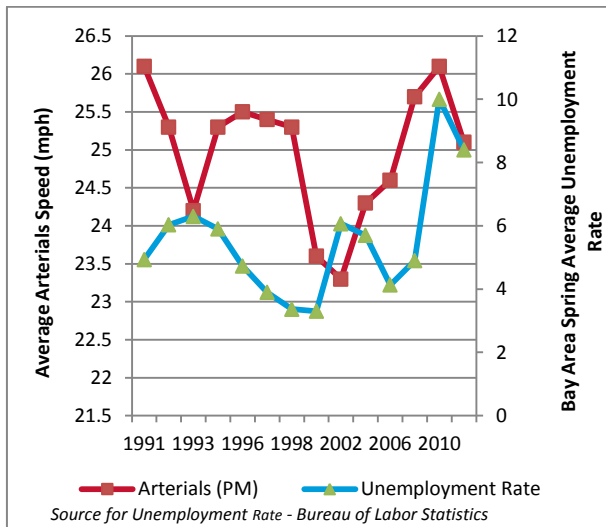


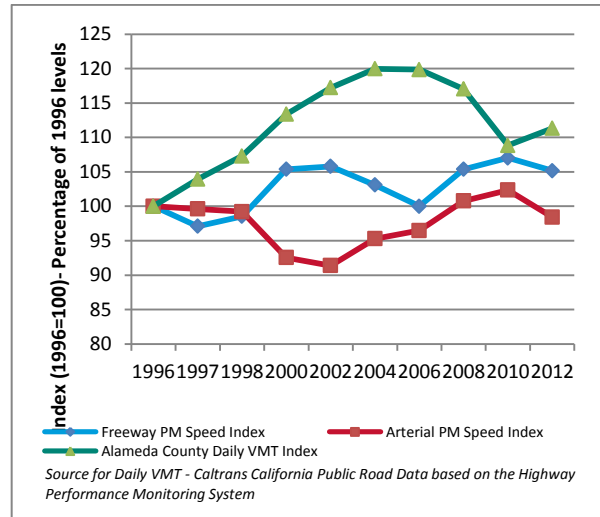
Chart 4: Average Arterial Speeds and Unemployment



Based on Caltrans' California Public Road Data, VMT on the Alameda County roadways increased from 32.8 million in 1996 to 36.5 million in 2011 (2011 data is the most recent estimation and is plotted for 2012 in the chart for ease of analysis). The highest throughput of 39.4 million VMT was experienced in 2004. Chart 5 illustrates that the speeds on the CMP roadways have been somewhat stable since 1996 fluctuating only within 10 percentage points despite the 20 percent increase experienced in VMT between 1996 and 2012. This could be the result of various congestion management activities undertaken in the county during

this period through planning and implementation of various programs and projects.

Chart 5: Average Speeds on the CMP Roadways in the p.m. and Increased Road Usage



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